REMARKS

Amendments have been made to the specification to correct minor translational and/or grammatical errors. No new matter has been added. Entry of these amendments is respectfully requested.

Claims 1-3 stand rejected under 35 U.S.C. §102(e) for anticipation by, or under 35 U.S.C. §103(a) for obviousness over, U.S. Patent No. 6,673,150 to Garibin et al. (hereinafter "Garibin"). Claims 1 and 2 stand rejected under 35 U.S.C. §102(b) for anticipation by U.S. Patent No. 6,309,461 to Gianoulakis et al. (hereinafter "Gianoulakis"). Claims 1 and 2 stand rejected under 35 U.S.C. §102(e) for anticipation by U.S. Application No. 2004/0099205 to Li et al. (hereinafter "Li"). Claims 1-3 stand rejected under 35 U.S.C. §103(a) for obviousness over Li or Gianoulakis in view of Garibin. These rejections are traversed in view of amendments to claim 1, corresponding cancellation of claim 3, and as applied to new claims 4-7.

Claim 1 has been amended to specify that the straight barrel part length of the claimed crystal has a length of 8 cm or more. Support therefor can be found at least in Example 1 (10 cm), Example 2 (8 cm), Example 3 (9 cm), and Example 4 (10 cm). New claims 4 and 5 require that the birefringence of the crystal is less than 1 nm/cm. Support therefor can be found at least in Example 4. New claims 6 and 7 require that the birefringence is about 0.892 nm/cm and are supported by Example 4.

Applicants respectfully traverse the prior art rejections in view of the amendment to claim 1 and for the following reasons.

Garibin discloses a calcium fluoride mono-crystal having a diameter of 300 mm, thickness of 70 mm and optical uniformity of $(1\text{-}3)\times10^{-6}$ and a birefringence of 1-3 nm/cm. The Office Action apparently equates the thickness of 70 mm (7 cm) as corresponding to the length of the straight barrel part of the crystal of the present invention. Claim 1 as amended requires a straight barrel part length of 8 cm or more; hence, Garibin does not anticipate the subject matter of claims 1, 2 and 4-7. Moreover, the process of growing a crystal described in Garibin involves the Bridgeman-Stockbargers method (BS method) in which a container such as a crucible containing a melt is moved through a temperature domain with a fixed

gradient under high vacuum in the presence of directional heat removal created by a set of shields. The BS method is distinct from the single crystal pulling method of Czochralski, the CZ method used in the present invention. Internal stress accumulates in the single crystal produced according to the BS method, such that birefringence becomes large. To overcome this problem, Garibin discloses a multi-compartment container including bowls stacked upon each other. In these bowls, the "thickness" of the resulting single crystal is restricted to a maximum of 7 cm. Nowhere does Garibin suggest a method for obtaining a single crystal having a thickness of 8 cm or more.

Gianoulakis supposedly discloses a method for crystal growth and annealing to produce a calcium fluoride crystal having a diameter of at least 6 inches. The patent describes a computer-simulated analysis of the material and asserts that a birefringence of less than 1 nm/cm can be produced according to Fig. 8. As noted at column 5, lines 43 to 45, the data on birefringence shown in Gianoulakis is merely the output of a computer simulation. No computer model is disclosed to explain how this was obtained, nor is there any description of the apparatus (size, material, etc.) and process (temperature, conditions, etc.) for the computer simulation. As such, Gianoulakis does not actually disclose a method for crystal growth which would result in the claimed birefringence. In addition, Gianoulakis fails to teach the thickness of the crystal as claimed and in particular a straight barrel part length of 8 cm or more. Accordingly, claim 1 and dependent claims 2 and 4-7 define thereover.

Li is directed to a calcium fluoride crystal having a diameter of 25 cm and a birefringence of 1.2 nm/cm or less. Li does not teach the thickness of the crystal, i.e., the length of the straight barrel part. The crystal produced according to Li is grown in multiple-crystal growth chambers 106 that are in communication with each other through holes 108. The thickness of the crystal is determined by the height of each of the growth chambers 106. As such, the apparatus of Li is similar to that of Garibin, and the thickness of the resulting crystal is significantly limited. There can be no teaching in Li to grow a crystal of a significant length of 8 cm or more as required by amended claim 1. In addition, the minimal birefringence of the

present invention of less than 1 nm/cm (claims 4 and 5) or of about 0.892 nm/cm (claims 6 and 7) is not taught or suggested by Li.

The combination of the teachings of Li or Gianoulakis with Garibin does not render obvious the subject matter of claims 1, 2 or 4-7. None of these patents teach or suggest a crystal grown to the length required by claim 1 of 8 cm or more. Garibin adds nothing further to Li or Gianoulakis to somehow motivate one skilled in the art to alter the crystal size to the claimed length. Accordingly, reconsideration of the rejections and allowance of claims 1, 2 and 4-7 is respectfully requested.

Respectfully submitted,

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